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## Sea Lice Plagues Return and Threat to Wild Salmon Increases

DFO documents reveal treatment failures and inability to protect migrating salmon.



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Major sea lice epidemics have erupted on Atlantic salmon fish farms on Vancouver Island's west coast over the last three months, according to industry, Fisheries and Oceans Canada and independent reports.

The outbreaks, which threaten the health of young wild salmon, have brought renewed calls for stricter regulations and the removal of open-net pens from the ocean.

They have also resulted in an apology from Cermaq, the Japanese-owned company that owns the affected fish farms.

In an open letter published in the Tofino-Ucluelet Westerly News last week, Cermaq managing director David Kiemele said “we were unable to effectively manage sea lice populations for a variety of reasons including unusually hot and dry weather” at its farms in Clayoquot Sound.

The company added that the Ahousaht and Tla-o-qui-aht Nations had put the company on notice to “do better in our management of sea lice.”

The federal government has done the same. In March, Federal Fisheries Minister Jonathan Wilkinson sent a formal letter to Cermaq requesting that it get epidemics under control, citing as many as seven compliance issues.

The government has refused to release the full letter, claiming “it is confidential correspondence between the Department and a business organization.”

As wild salmon migrate past fish farms between the months of March and June, the industry is supposed to keep parasite levels below three “motile” lice per fish, a level set by Fisheries and Oceans Canada and industry. (Motile refers to sea lice capable of moving from the salmon.)

But managing such epidemics continues to be a troublesome and expensive battle for the global industry and its regulators.

At three Cermaq farms, sea lice loads on farmed fish this spring have exceeded regulations, resulting in high sea lice rates for young wild salmon in Clayoquot Sound, said Bonny Glambeck, director of the conservation group Clayoquot Action.

“At one point during the out-migration, sampling of smolts at the Cedar Coast Field Station found 100 per cent of the juveniles were infected with sea lice,” Glambeck said.

“If this happens for a couple more years we won’t have any wild salmon left in Clayoquot Sound,” she added. “This is the second year in a row and there should be stiff penalties for the company.”

The DFO confirmed that three of nine active sites operated by Cermaq were over the threshold for sea lice. The company has harvested fish at two of the sites to

deal with the problem, but the third infested site won't be harvested until mid-June.

In the Broughton Archipelago on the east side of the island, high infection rates have also been recorded on wild juvenile salmon near Cermaq's Burdwood and Sir Edmund salmon farms.

Alexandra Morton, an independent researcher who has warned the DFO about sea lice epidemics for 19 years, said she hasn't seen levels this high since 2001 in wild young smolts that she and other researchers sample near the shoreline.

But fish farms in the Broughton region have reported sea lice levels below federal standards, says the DFO.

"Either the farm lice counts don't accurately represent the total number of lice in the farm, or farm lice limits are too high," said Morton, who has asked the DFO to investigate why the sea lice infestation is so bad for wild salmon in the Broughton region this year.

The situation in Clayoquot Sound got so desperate last year that Cermaq, a subsidiary of the Mitsubishi Corporation headquartered in Oslo, Norway, applied to Health Canada for an emergency permit to use a new treatment called [Lufenuron](#). The drug is commonly used to control fleas in pet dogs and cats.

But even Norway, home to the biggest salmon farming industry and annual sea lice plagues, hasn't approved the chemical.

Morton said that Norwegian researchers told her there are concerns that the chemical makes fish unsafe for human consumption. The Health Canada permit allowing Cermaq to use Lufenuron says it has to wait 350 days after the last use before harvesting the fish.

Morton said a collection of more than 400 documents on last year's epidemic that she obtained through a freedom of information request also reveal Fisheries and Oceans Canada is unable to enforce sea lice regulations.

An internal DFO memorandum prepared for the deputy minister in 2018 concluded that "currently management approaches have been ineffective to reduce sea lice loads" and called for reforms.

In a reply to a series of questions from The Tyee, DFO spokesperson Michelle Rainer said companies aren't violating their licences when sea lice infestations exceed the limits.

"Exceeding thresholds for sea lice is not a licence violation but a trigger to implement management measures to bring lice levels down," she wrote. "Failure to implement management measures to reduce sea lice levels is a licence violation."

Rainer added that the Clayoquot outbreaks may be due to higher saline levels in local waters (there was little rain this spring), which produce conditions favourable for sea lice.

"Higher salinity has resulted in increased lice production in the region and exacerbated the lice levels on farms," said Rainer. "The warmer waters and favourable conditions for sea lice may be caused by climate change."

Cermaq promised to respond to requests for an interview but failed to do so.

Linda Sams, sustainable development director for Cermaq Canada, recently **told the CBC** that the company appreciates that it needs "to keep levels low on our farms."

Sea lice are common parasites on wild salmon and trout along the coast. But fish farms have resulted in much higher levels of the lice on wild fish.

The aquaculture industry unnaturally concentrates large populations of farmed fish in one location, where they act as incubators for parasites and pathogens. These industrial feedlots have changed sea lice dynamics in Canada, Scotland, Norway, Ireland and Chile.

According to a new **report** by IntraFish, sea lice cost the industry as much as \$1 billion a year in damage to farmed fish.

Sea lice plagues also explain why many Norwegian firms are exploring closed containment systems on land.

The parasite feeds on a fish's mucus, skin and muscle and can severely damage fins, introduce disease and impair swimming performance. Just one to three lice can kill a young wild salmon, which have yet to develop protective scales.

In Clayoquot Sound, migrating wild smolts must run a gauntlet of 20 farms. Sea lice numbers on some farms are up to five times higher than the level set by Fisheries and Oceans Canada.

At one point last year, half of Cermaq's 14 farms reported sea lice loads above regulatory limits, many for the duration of the out-migration season. The infestation, combined with poor water conditions, forced Cermaq to euthanize all the fish at its Fortune Channel farm last August.

The threat posed to wild populations by sea lice epidemics on fish farms is profound but not well studied in Canada.

According to a blunt 2018 Norwegian report, "Salmon farming increases the spread and abundance of salmon lice in marine habitats, and thereby the risk of infection and mortality among wild salmon and sea trout in areas with fish farms."

The report said wild fish in farm-intensive areas typically carry lice with the same resistance to chemicals administered in feed at farms or hatcheries.

The study estimated that sea lice resulted in annual losses of 10 per cent of wild salmon populations.

"Impacts on salmon populations due to salmon lice in farm-intensive areas can be severe," it concluded, "ultimately reducing the number of adult fish due to salmon lice induced mortality, resulting in reduced stocks and reduced opportunities for fisheries."

Sea lice have become such a fixture in the industry that Morton found one in a package of farmed salmon in a North Vancouver Superstore two weeks ago. (She regularly buys farmed fish in stores to test them for viruses and other pathogens.)

In Scotland, fish farms have also been plagued with sea lice outbreaks so pernicious that returning wild salmon have been found covered with nearly 800 lice after passing through waters housing infected farms in the Outer Hebrides.

In B.C., the problem has been growing for several years now, with sea lice levels exploding at fish farms in Klemtu in 2015, Esperanza Inlet in 2017 and Clayoquot Sound in 2018 and this spring.

Sea lice epidemics were not a common phenomenon in wild salmon until the industry planted fish farms on migratory routes nearly three decades ago.

Last year's outbreak caused a **flurry of communication** between the DFO and Cermaq as anti-lice chemical treatments with the feed additive SLICE failed and the company applied for permission to use hydrogen peroxide and Lufenuron.

The correspondence, obtained by Morton through a freedom of information request and released by Clayoquot Action, portrays an industry and regulator struggling to contain a biological problem that is killing wild salmon.

One email dated May 4, 2018, between two DFO staffers at the aquaculture management division acknowledged the department was powerless to take action on sea lice levels that exceeded allowed levels at Cermaq's farms in Clayoquot Sound.

"DFO staff confirmed exceedance of sea lice thresholds for these farms (one was as high as 23 lice per fish) and... have been working with Cermaq to address. We do not have any other regulatory tools to require action."

Later DFO memos on June 12, 2018, noted that the failure by numerous farms to "implement a plan which will reduce the absolute sea lice inventory within the containment structure array" may represent a "a non-compliance with Condition of Licence."

A June 2018 internal bulletin on the sea lice outbreak that later became a memo for the department's deputy minister also highlighted major loopholes in the regulations.

When chemical treatments fail to control lice, industry says it will harvest the fish to control the outbreak. But the capacity of companies to harvest more fish is limited due to processing plant size and the number of harvest vessels. As a result, the outbreak continues and wild salmon suffer the consequences.

"The limitation has been encountered with all three major salmon farming companies in three of the past four out-migration periods," said a DFO memo.

"Without effective enforcement companies have a perverse incentive to use harvest as a management tool during the out-migration which meets the letter of the conditions of licence but certainly not the spirit or objective of preventing undue lice challenge to out-migrating smolts."

Yet DFO's Rainer told The Tyee that "harvesting remains an effective measure for reducing sea lice levels at salmon farms in B.C."

When existing treatments failed to control the lice outbreak, the industry applied to Health Canada for an Emergency Drug Release for Lufenuron late last summer.

The chemical inhibits the production of chitin in lice, which prevents them from forming an exoskeleton.

But many sea creatures, like crabs and prawns, depend on chitin to develop outer shells.

Neither the U.K nor Norway has approved the drug for use on salmon, although regulators in Chile have approved it.

Health Canada released the drug to Cermaq but warned fish treated with Lufenuron "can't be slaughtered for use in food for at least 350 days after the latest treatment."

If the drug is used at a site, companies should "allow at least one year following treatment with Lufenuron to allow natural systems to recover," Health Canada said. Fish that are sold must also be tested for drug residue.

In B.C., sea lice plagues have followed a grim and predictable trajectory of increasing resistance to available treatments. At first industry deployed chemical treatments such as SLICE.

But as the parasites developed resistance, chemical treatments failed and the outbreaks worsened.

The Norwegian industry has abandoned chemicals and now relies on fish such as wrasse that eat lice; warm and fresh water treatments (lice detach from salmon in such baths); or mechanical treatments such Hydrolicer, where the salmon are pumped into a tube where moving water removes the lice.

But a recent Norwegian study [noted](#) that there is little published data on the effectiveness of mechanical and thermal delousing systems.

Cermaq told the DFO last summer that it couldn't use the delousing equipment "due to design flaws" that put "the welfare of the treated fish in jeopardy."

The DFO is now conducting research on using Pacific perch as “cleaner fish” to pick off the lice in fish farms as well as dousing farmed fish in warm water to kill the sea lice.

Cermaq is also experimenting with a “closed containment” ocean system in Norway that might be used in Canada by 2020.

The DFO has a history of ignoring and denying the impacts of sea lice on wild salmon.

In his new book *Vanishing Fish*, fisheries biologist Daniel Pauly describes how DFO officials responded to research by Morton that netted young salmon covered with sea lice near fish farms in 2004.

Pauly says at the time DFO officials told him that Morton had “spiked” the fish with individual parasites.

Having collected the samples with Morton in 2004, Pauly “knew this was a horrible lie and just the beginning of a concerted effort to discredit Alexandra’s findings.”

Last week the DFO **announced** that “the Government of Canada is moving forward on developing an action plan to address the enforcement of sea lice regulations in coastal waters.”

It’s overdue. A Sept. 18 document obtained under the freedom of information request noted: “DFO conditions of licence relating to sea lice have been found to be vague, outdated and sometimes unenforceable.” 🐟

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Link: <https://thetyee.ca/News/2019/06/11/Sea-Lice-Plagues-Return/>